THE

Maryland Agricultural College QUARTERLY

ENTERED AT COLLEGE PARK (MD.) POST OFFICE AS SECOND-CLASS MATTER

No. 64. MAY 1914

AGRICULTURAL LIME ANALYSES

H. J. PATTERSON, President

Edited by H. B. McDONNELL, State Chemist

Published for the Benefit of Agriculture, and Sent Free to Anyone Desiring a Copy

Issued in the Months of February, May, August and November

ADDRESS

Chemical Department, Maryland Agricultural College

COLLEGE PARK, MD.

ANALYSES OF

Agricultural Lime Sold in Maryland

BY THE CHEMICAL DEPARTMENT OF

The Maryland Agricultural College

Dr. H. B. McDonnell, Professor of Chemistry,—State Chemist.
L. B. Broughton, M. S., Associate Professor of Chemistry.
T. D. Jarrell, B. S., First Assistant Chemist.
A. C. Adams, B. S., Assistant Chemist.
P. L. Gowen, B. S., Assistant Chemist.
Arthur M. Gibson, Assistant Chemist.
C. G. Remsburg, B. S., Assistant Chemist.
F. G. Baggs, Clerk.

The tables on the following pages contain the results of the analysis of agricultural lime from June, 1913, to May, 1914, inclusive.

The principal use of agricultural lime is to neutralize acid in the soil and its value for this purpose, either in the commercial oxide, or burnt lime, slaked—or hydrated lime or carbonate of lime (either as ground limestone or oyster shells), depends on the amount of oxide of lime present. Oxide of magnesia is generally present to a greater or lesser extent in limestone and this is slightly more efficient than an equal amount of lime in correcting acidity, so that, for comparative purposes, the amounts of the two oxides should be added.

It should be remembered that commercial lime will vary somewhat in composition, even from the same quarry, from time to time, so that a few points in favor of a certain brand as against another brand, may mean nothing, as the figures may be reversed in the next analysis.

All the forms of lime mentioned are good and the form to use depends on local conditions—the kinds available, the comparative

prices, cost of freight, distance of haul and ease and cheapness of application, etc.

All forms are best applied on top of plowed ground and harrowed in. Quick lime, hydrated lime and gas lime should be applied some time before sowing the crop. Quick lime soon takes up water and slakes when spread out and then takes up carbonic acid gas and is converted to the carbonate, similar to the original limestone.

The application of excessive amounts of quicklime may do harm to the soil by destroying organic matter.

The proper fineness when ground limestone is used is a point on which there are differences of opinion and, again, should depend somewhat on local conditions. All agree that the finer the grinding the quicker the action and the sooner the lime will be used up. Where a coarser product is much cheaper and the freight and hauling comparatively small the coarser product may be used to advantage, using more of it to the acre and applying less frequently.

It will be noted that in case of the quicklimes in the table that the sum of the oxides of lime and magnesia and the insoluble matter will fall short of 100 per cent. The difference is made up of carbon dioxide gas, oxides of iron and alumina, combined water, etc. In practice the carbon dioxide is never completely driven out of lime in burning; frequently from 2 to 5 per cent, and even more, will remain in the quick lime. The latter also slowly takes up this gas from the air on standing.

Lime, in connection with clover, or other legumes, will, to a large extent, take the place of the expensive nitrogen (ammonia) of commercial fertilizers, but will not greatly relieve the necessity for phosphates and potash.

Lime should be handled, when possible, in carload lots, to avoid unnecessary expense. Where one farmer does not need so much at one time he should be able to arrange with one or more neighbors to get a full car. In many places in this State successful agriculture depends, to a great extent, on proper liming.

A ton of quick lime or two tons of ground stone or shells is a very common amount to apply per acre.

ANALYSES OF LIME.

No.	Name of Manufacturer or Agent.	Name of Lime or Kind.	Place of Sampling.	Lime Oxide CaO		Magnesia Oxide MgO		Sand & Insoluble (of no value)	
				FOUND.	Guaranteed.	FOUND.	Guaranteed.	FOUND.	Guaranteed.
110	American Agr'l Chemical Co., New York, N. Y.	Nova Scotia Land Plaster	Baltimore.....	33.60	30.00	.43		1.48	
111	Armour Fertilizer Works, Baltimore, Md.	Nova Scotia Land Plaster.	Baltimore.....	34 24		.24		2.10	
144	" " "	Nova Scotia Land Plst'r	Baltimore.....	38.28	30.00	.49		.65	
194	J. E. Baker & Co., York, Pa.	Empire Lump Lime....	Whaleyville...	59.16	60.00	8.93	19.00	12.57	
91	Baltimore Lime Products Co., Baltimore, Md.	Agricultural Lime..... Gas Lime.....	Baltimore.....	46.06	48.53	.47		4.57	
145	" " "	" " "	Baltimore.....	43.36	48.53	.29		6.14	
93	S. W. Barrick & Son, Woodsboro, Md.	Agricultural Lump Lime	Woodsboro ...	77.50		9.14		6.70	
146	" " "	Agricultural Lump Lime	Woodsboro....	84.15		4.66		3.93	
94	" " "	Ground Agr'l Lime.....	Woodsboro....	74.45	85.00	7.77		4.95	
147	" " "	Ground Agr'l Lime.....	Woodsboro...	71.14	85.00	3.35	2.00	7.17	
95	" " "	Hydrated Lime.....	Woodsboro....	60.14	50.00	3.57		7 08	
148	" " "	Hydrated Lime... ...	Woodsboro....	58.19	50.00	5.47	2.00	6.70	
175	Baugh & Sons Co., Balto., Md.	Nova Scotia Land Plst'r	Baltimore.....	39.42		.69		5.17	
161	Wm. Brown, Walkersville, Md.	Agricultural Lime.....	Walkersville..	86 38		9.20		1.78	
183	M. G. Bushey & Son, Cavetown, Md.	Agricultural Lime.....	Cavetown.....	76.43		21.20		1.20	
162	Henry Canaryman, Cumberland, Md.	Agricultural Lime.....	Cresaptown...	84.84		4.82		1.67	
187	G. M. Catlin & Co., White Haven, Md.	*Oyster Shell Lime....	White Haven..	48.82		.65		6.30	
163	David Devilbiss, Walkersville, Md.	Agricultural Lime... ..	Walkersville..	86.98		6.09		1.60	
191	Edison Portland Cement Co., Stewartsville, N. J.	*Pulverized Lime Stone	Baltimore.....	49 29	50.00	3.08		8.14	
139	Emig Lime Co., Hellam, Pa.	Agricultural Lime.....	White Hall ...	63.80		.47		21.73	
112	D. Feeney, Texas, Md.	Agricultural Lime.....	Monkton.....	71.60		3.21		8.67	
122	" " "	Blue Alum Lime.....	Texas.....	85.75		2.81		9.15	
96	Fountain Rock Lime Co., Woodsboro, Md.	Agr'l Lump Lime.....	Walkersville..	91.85		1.09		1.37	
149	" " "	Agr'l Lump Lime.....	Fountain Rock.	74.75		12.69		5 73	
97	" " "	Ground Lime.....	Walkersville..	62.55		10 20		9.94	
164	" " "	Ground Lime.....	Fountain Rock.	69.69		8.08		11.84	
98	" " "	Hydrated Lime.....	Walkersville...	56.65		10.40		11 17	
165	" " "	Hydrated Lime...	Fountain Rock.	55.59	50.00	6.02		11.51	
142	W. J. Gordon, Popes Creek, Md.	Agricult'l Lime (Marl.)	Popes Creek...	33.88		.55		31.15	

97	" " "	Ground Lime	Walkersville ..	62.55		10 20		9.94
164	" " "	Ground Lime	Fountain Rock.	69.69		8.08		11.84
98	" " "	Hydrated Lime	Walkersville...	55.05		10.40		11.17
165	" " "	Hydrated Lime	Fountain Rock.	55.59	50.00	6.02		11.51
142	W. J. Gordon, Popes Creek, Md.	Agricult'l Lime (Marl.)	Popes Creek...	33.88		.55		31.15
113	Louis Grebb Oyster and Fruit Packers, Baltimore, Md.	*Shell Dust	Baltimore	51.55		.61		3.65
188	" " "	*Shell Meal	Princess Anne.	44.58		2.39		13.75
134	R. S. Green & Co., Balto, Md.	Oyster Shell Lime	Frederick Road	75.75		.80		8.29
88	M. J. Grove Lime Co. Frederick, Md.	Agricultural Lump Lime	Lime Kiln	72.20		16.65		2.00
150	" " "	Agricultural Lump Lime	Frederick	92.00		5.08		1.04
99	" " "	Gr'nd Agr'l Quick Lime	Frederick	59.35		3.75		12.42
151	" " "	Gr'nd Agricultural Lime	Frederick	66.75		5.60		16.02
132	Chas. E. Houck, Frederick, Md.	Agricultural Lump Lime	Frederick	65.35		2.24		12.06
166	" " "	Agricultural Lump Lime	Frederick	75.19		4.87		13.46
100	Alvah Isanogle, Thurmont, Md.	Agricultural Lump Lime	Lewistown	54.90		31.03		5.05
167	" " "	Agricultural Lump Lime	Lewistown	53.71		35.12		2.27
101	H. J. Kneriem, Cresaptown, Md.	Agricultural Lump Lime	Cresaptown	83.55		3.39		7.62
102	O. J. Keller Lime Co., Buckeystown, Md.	Agricultural Lump Lime	Buckeystown..	94.66		3.50		1.02
114	" " "	Agricultural Lime	Rockville	67.70		7.48		10.56
168	" " "	Agricultural Lime..	Buckeystown..	92.63		5.15		.63
89	D. C. Kemp Lime Co., Frederick, Md.	Agricultural Lump Lime	Frederick	83.20		4.71		6.28
152	" " "	Agricultural Lump Lime	Frederick	79.49		10.73		8.38
189	Knickerbocker Lime Co., Philadelphia, Pa.	Run of Kiln Agr'l Lime	Lambson	54.45	50.00	36.97		6.39
192	Legore Combination Lime Co., Legore, Md.	Agricultural Lump Lime	Legore	79.70		4.84		6.52
104	" " "	Ground Agr'l Lime	Legore	70.10		5.47		10.95
154	" " "	Ground Agr'l Lime	Legore	64 76		3.26		11.50
105	" " "	Hydrated Lime	Legore	60.25		4.64		9.57
155	" " "	Hydrated Lime	Legore	59.05		5.91		7.09
123	W. P. Lindsay, Texas, Md.	Agricultural Lime	Texas	73.20		8.44		15.03
90	M. F. McAleer, Walkersville, Md.	Agricultural Lump Lime	Walkersville...	79.80		3.19		5.44
177	Maryland Poultry Supply Co., Baltimore, Md.	*Agricultural Lime (Gr. Oyster Shells)	Baltimore	46.19		2.21		11.90
190	Merion Lime and Stone Co., Norristown, Pa.	Run of Kiln Lime	Massey	55.89	45.00	35.74	30.00	2.22
128	Moore-Pendleton Co., Westover, Md.	*Pulv'ized Oyster Shells	Westover	53.75	50.00	.53		2 19
156	" " " "	*Pulv'ized Oyster Shells	Westover	52.81	50.00	.80		2.70
129	G. Ober & Sons Co., Balto., Md.	Nova Scotia Land Pl'str	Baltimore	34.24	30.00	.24		1 03
180	Lowell M. Palmer, York, Pa.	Chall'ge Hydrated Lime	White Hall	67.39		6.05		.27
135	" " " " "	Ground Stone Lime	Frederick Road	55.95		30.52		2.71

*For mechanical analysis see page 8

ANALYSES OF LIME.

No.	Name of Manufacturer or Agent.	Name of Lime or Kind	Place of Sampling.	Lime Oxide CaO		Magnesia Oxide MgO		Sand & Insoluble (of no value)	
				FOUND.	Guaranteed.	FOUND.	Guaranteed.	FOUND.	Guaranteed.
92	Peerless Oyster Co., Baltimore, Md.	Ground Oyster Shells...	Baltimore	50.51		.94		4.32	
116	" " "	*Ground Oyster Shells..	Baltimore	51.90		1.03		4.17	
157	" " "	*Ground Oyster Shells..	Baltimore	47.79		.91		8.95	
195	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Nova Scotia Land Plaster	Baltimore	33.78		.11		1.22	
140	M. B. Price, Cockeysville, Md.	Mixed Lime; White, Blue	Cockeysville...	83.80		2.03		9.33	
169	R. H. Ramsburg, Frederick, Md.	Agricultural Lime.....	Frederick.....	91.58		2.21		1 95	
133	Ralph Riggins & Bro., Crisfield, Md.	*Ground Oyster Shells..	Crisfield.....	48.65		.64		6.83	
158	" " "	*Ground Oyster Shells..	Crisfield.....	51.22		1.09		5.77	
176	Rasin - Monumental Co., Baltimore, Md.	Nova Scotia Land Plaster	Germantown ..	34.66		.69		2.27	
184	D. F. Roddy, Emmitsburg, Md.	Agricultural Lump Lime	Emmitsburg...	83.87		6.60		4.02	
193	F. S. Royster, Guano Co., Baltimore, Md.	Nova Scotia Land Plaster	Baltimore	36.55		.14		2.65	
178	Security Cement & Lime Co., Baltimore, Md.	Berkeley Hydr'd Lime..	Sykesville.....	71.29	70.00	2 36		2.30	
117	" " "	Berkeley Hydr'd Lime..	Oakland.....	67.70		1 90		1.76	
106	Shank & Etzler, Frederick, Md.	Agricultural Lump Lime	Frederick.....	56.70		38.39		3.58	
143	" " "	Dark Agricultural Lime	Frederick.....	71 10		3.41		4 67	
170	Charles E. Staley, Frederick, Md	Agricultural Lime.....	Frederick.....	92.74		4 89		1.91	
109	Standard Lime & Stone Co., Baltimore, Md.	Agricultural Lump Lime	Buckeystown.	88 60		3.23		1.29	
171	" " "	Agricultural Lime.....	Buckeystown..	95.45		2 03		1.70	
118	" " "	*Ground Limestone.....	Rockville.....	53.40	50.00	1.27		2 34	
120	" " "	Hydrated Lime.....	Mt. Airy.....	64.65	60.00	9.19		1.65	
179	" " "	Hydrated Lime	Sykesville.....	71 29	70.00	2.81		1 62	
107	Tabler Lime & Stone Co., Frederick, Md.	Agricultural Lump Lime	Frederick.....	85 35		5.35		5.81	
159	" " "	Agricultural Lime.....	Frederick	83.02		.69		5.70	
108	" " "	Ground Agr'l Lime.....	Frederick	60.60		4.53		17.24	
160	" " "	Ground Agr'l Lime.....	Frederick	60 59		3.44		18.88	

179	" " "	Hydrated Lime	Sykesville.....	71 29	70.00	2.81		1 62	
107	Tabler Lime & Stone Co., Frederick, Md.	Agricultural Lump Lime	Frederick.....	85 35		5.35		5.81	
159	" " "	Agricultural Lime.....	Frederick	83.02		.69		5.70	
108	" " "	Ground Agr'l Lime.....	Frederick	60.60		4.53		17.24	
160	" " "	Ground Agr'l Lime.....	Frederick	60 59		3.44		18.88	
136	Talbot Mfg. Co., St. Michaels Md.	*Ground Oyster Shell ..	St. Michaels...	35.85		.64		24.71	
124	Texas Lime & Stone Co., Texas, Md.	Blue Stone Lime.....	Texas.....	72.85		13.36		8.30	
125	" " "	White Alum Lime.....	Texas.....	77.00		1.02		2.57	
127	Tidewater Portland Cement & Lime Co., Union Bridge, Md.	Hydrated Lime.....	Reisterstown..	69.05	71.50	1.59	.50	4.12	
186	" " "	Hydrated Lime.....	Chewsville	70 18		2.14		1.87	
137	W. H. Valliant & Bros., Bellevue, Md.	*Ground Oyster Shells..	Belleview	44.34		.73		12.91	
181	Chas. Warner Co., Wilmington, Del.	Limoid (Hydrate of Lime)	Conowingo	43.14	47.00	32.67	31.00	1.08	
130	" " "	Pulverized Burnt Lime	Federalsburg..	54.90	53.10	35.69	37.40	2.74	
182	" " "	Pulverized Burnt Lime	Conowingo	57.59	53.10	33 23	37.40	1 84	
119	W. M. Widmeyer, Hancock, Md.	Agricultural Lump Lime	Hancock	80.65		2 30		12.79	
172	" " "	Agricultural Lime.....	Hancock	86.40		1.78		6 35	
138	G. W. Woolford & Co., Cambridge, Md.	Burnt Oyster Shell Lime	Cambridge	59.40		.33		2.25	
141	Rob't A. Wooldridge Co., Baltimore, Md.	Nova Scotia Plaster....	Baltimore	37.87		.38		1.64	
173	Wrightsville Lime Co., Wrightsville, Pa.	Stone Lime.....	Prices Sta.....	86.24		4.86		6.25	
174	York Valley Lime Co., York, Pa.	Agricultural Stone Lime	Sudlersville ...	82.52	75.00	6.13		2.59	

*For mechanical analysis see page 8.

TABLE II—SHOWING MECHANICAL ANALYSIS OF GROUND LIME STONE AND GROUND OYSTER SHELL

For the Chemical Analysis of these samples see preceding table

Figures are percentages or pounds per hundred

No.	Name of Manufacturer or Agent	Name of Lime or Kind	Finer than 100 mesh	Bet. 80 and 100 mesh	Bet. 60 and 80 mesh	Bet. 40 and 60 mesh	Bet. 20 and 40 mesh	Coarser than 20 mesh
187	G. M. Catlin & Co., White Haven, Md.	Oyster Shell Lime (Ground Shells)	25	7	3	13	18	34
191	Edison Portland Cement Co., Stewartsville, N. J.	Pulverized Lime Stone....	93	6	1	0	0	0
113	Louis Grebb Oyster & Fruit Packers, Baltimore, Md.	Shell Dust.....	31	14	8	22	22	3
188	" " "	Shell Meal.....	30	13	10	20	22	5
177	Maryland Poultry Supply Co., Baltimore, Md.	Agr'l Lime (Ground Shells)	35	15	7	24	17	2
128	Moore-Pendleton Co., Westover, Md.	Pulverized Oyster Shells...	22	8	4	12	18	36
156	" " "	Pulverized Oyster Shells..	16	5	4	14	26	35
116	Peerless Oyster Co., Baltimore, Md.	Ground Oyster Shells.....	28	16	10	29	16	1
157	" " "	Ground Oyster Shells.....	26	10	9	17	31	7
133	Ralph Riggins & Bro., Chrisfield, Md.	Ground Oyster Shells.....	32	11	6	20	23	8
158	" " "	Ground Oyster Shells.....	20	7	4	13	21	35
118	Standard Lime and Stone Co., Baltimore, Md.	Ground Limestone.....	73	16	4	6	1	0
136	Talbot Mfg. Co., St. Michaels, Md.	Ground Oyster Shells.....	24	16	9	25	25	1
137	W. H. Valliant & Bro., Bellevue, Md.	Ground Oyster Shells	17	11	7	20	26	19